Common Core State Standards

Mathematics

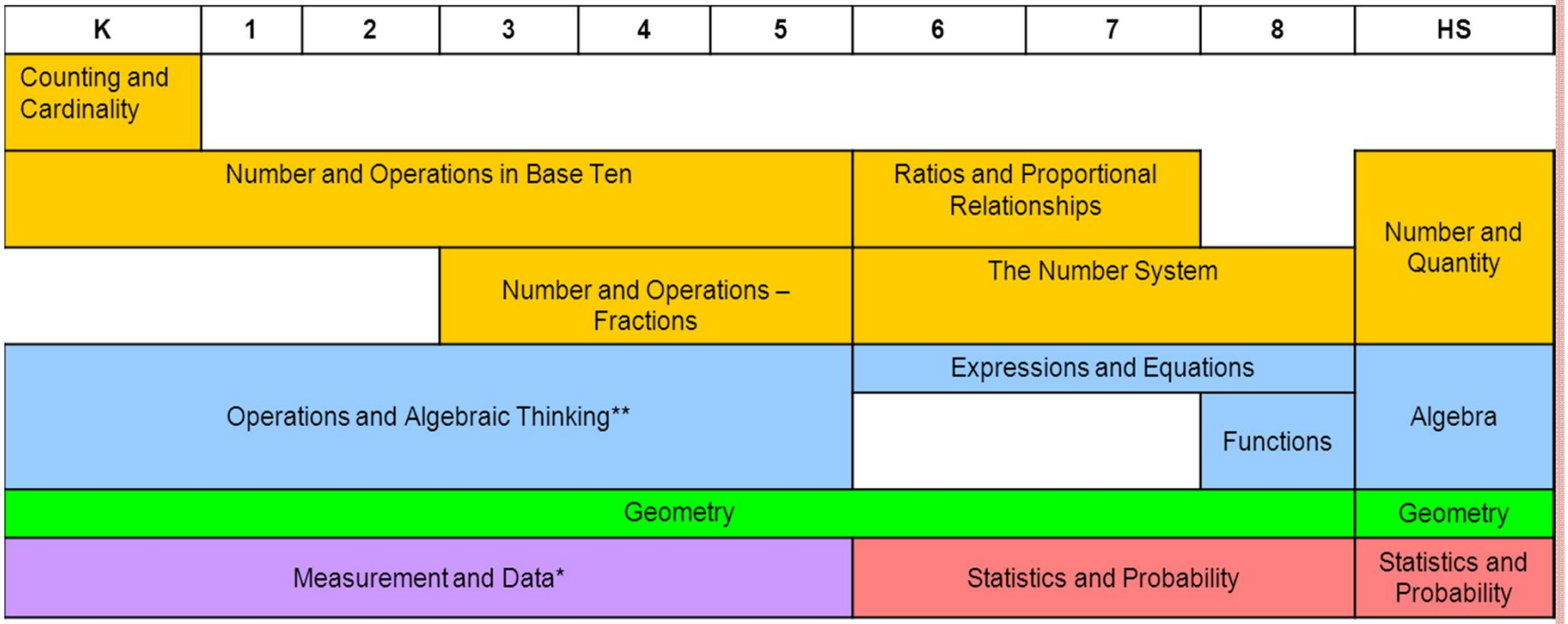
Learning Progressions

A Working Definition…

"Learning progressions are descriptions of the successively more sophisticated ways of thinking about a topic that can follow one another as students learn about and investigate a topic over a broad span of time."

NRC (2007)*Taking Science to School*

Learning Progressions



* K-5 Measurement and Data splits into Statistics and Probability and Geometry in Grade 6

**Operations and Algebraic Thinking is foundation for Grade 6 Expressions and Equations and The Number System

Mathematical Standards for High School

Conceptual Categories

1. Number & Quantity
2. Algebra
3. Functions
4. Modeling
5. Geometry
6. Statistics & Probability

Course Pathway

Traditional

Integrated

MTI: Mathematical Thinking for Instruction & Mathematical Practices

MTI - Focus and Framework

5 Big Ideas

MTI – Mathematical Thinking for Instruction

MATHEMATICAL PRACTICES

- **Make sense of problems and persevere in solving them.**
- **Reason abstractly and quantitatively.**
- **Construct viable arguments and critique the reasoning of others.**
- **Model with mathematics.**
- **Use appropriate tools strategically.**
- **Attend to precision.**
- **Look for and make use of structure.**
- **Look for and express regularity in repeated reasoning**

CRITICAL AREAS

- Focus
- Clarify
- Learning Progression

Critical Areas – 2nd Grade

CCSS p. 17

GEOMETRY

- Describing and analyzing shapes.

Clarity

- Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing and analyzing two-and three dimensional shapes, students develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades.

Critical Areas – 3rd Grade

CCSS p. 21

GEOMETRY

- Describing and analyzing two-dimensional shapes.

Clarity

- Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole

Critical Areas – 4th Grade

CCSS p. 27

GEOMETRY

- Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

Clarity

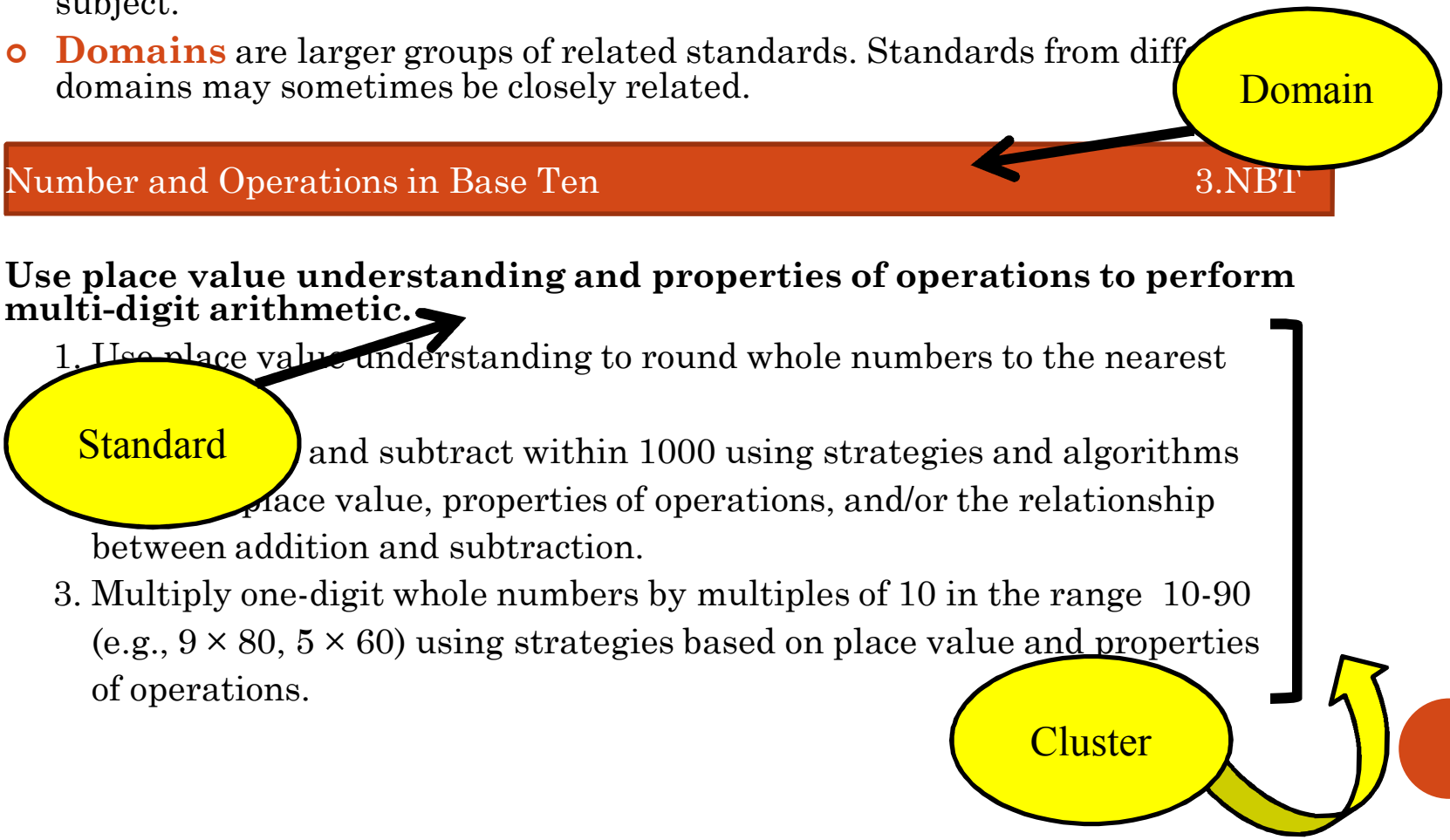
- Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

Content Standards

How to read the grade level standards

P. 5

- **Standards** define what students should understand and be able to do.
- **Clusters** are groups of related standards. Note that standards from different clusters may sometimes be closely related, because mathematics is a connected subject.
- **Domains** are larger groups of related standards. Standards from diff domains may sometimes be closely related.



Learning Progression → Specific Content Standard

2nd Grade – Reason with shapes and their attributes.

3rd Grade – Reason with shapes and their attributes.

4th Grade - Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

Geometry Domain

Learning Progression → Clusters - More specific

2nd Grade – Recognize & draw based on attributes, partition into equal shares, & describe the whole in relationship to the shares.

3rd Grade – Categorize shapes, partition into equal areas, and express as a unit fraction of the whole.

4th Grade - Classify shapes by properties of their lines & angles and recognize and draw lines of symmetry.

Geometry Cluster

Integration

- Cross Curricular Integration
- Integration Across the Content Domains

Cross Curricular Integration – Making Math Meaningful

AUTHENTIC LITERACY

- To promote mathematical reasoning and thinking skills, integrate reading, writing, and discussion into problem solving, application, connection, and interpretation.

Examples

- Open-ended, extended-response, and word problems.
- Math notebooks or journals (Vocabulary)
- Students present different problem solving methods; written form and orally.
- Students make connections between different problem solving methods
- Students prove and argue problem solving strategies.
- Reading mathematical literature
- Collecting, analyzing, interpreting, and creating graphical representations for statistical data
- Cross-curricular projects.

Integration across the Content Domains

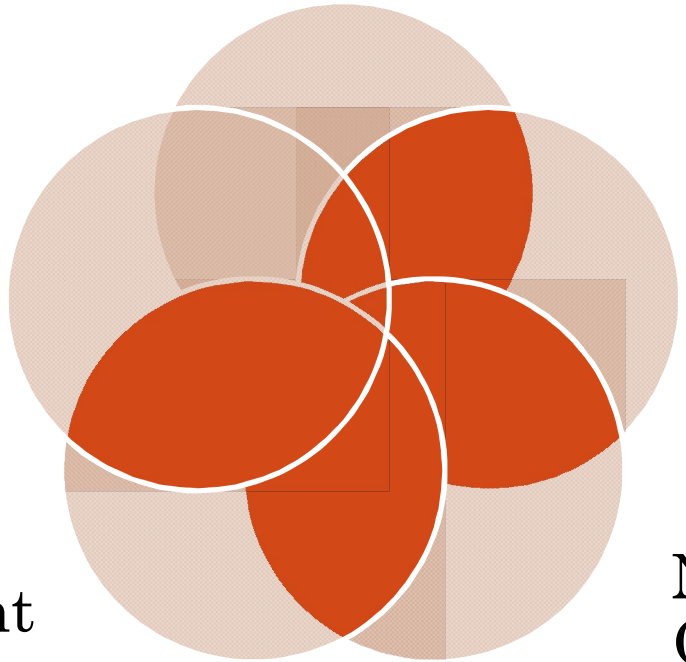
- Content domains depend on each other to make sense and instill more meaning when learning mathematics.

- Integration of the content domains ensures meaningful application and connection to the real-world.

4th Grade Integrated Content Domains

Operations and Algebraic Thinking

Geometry



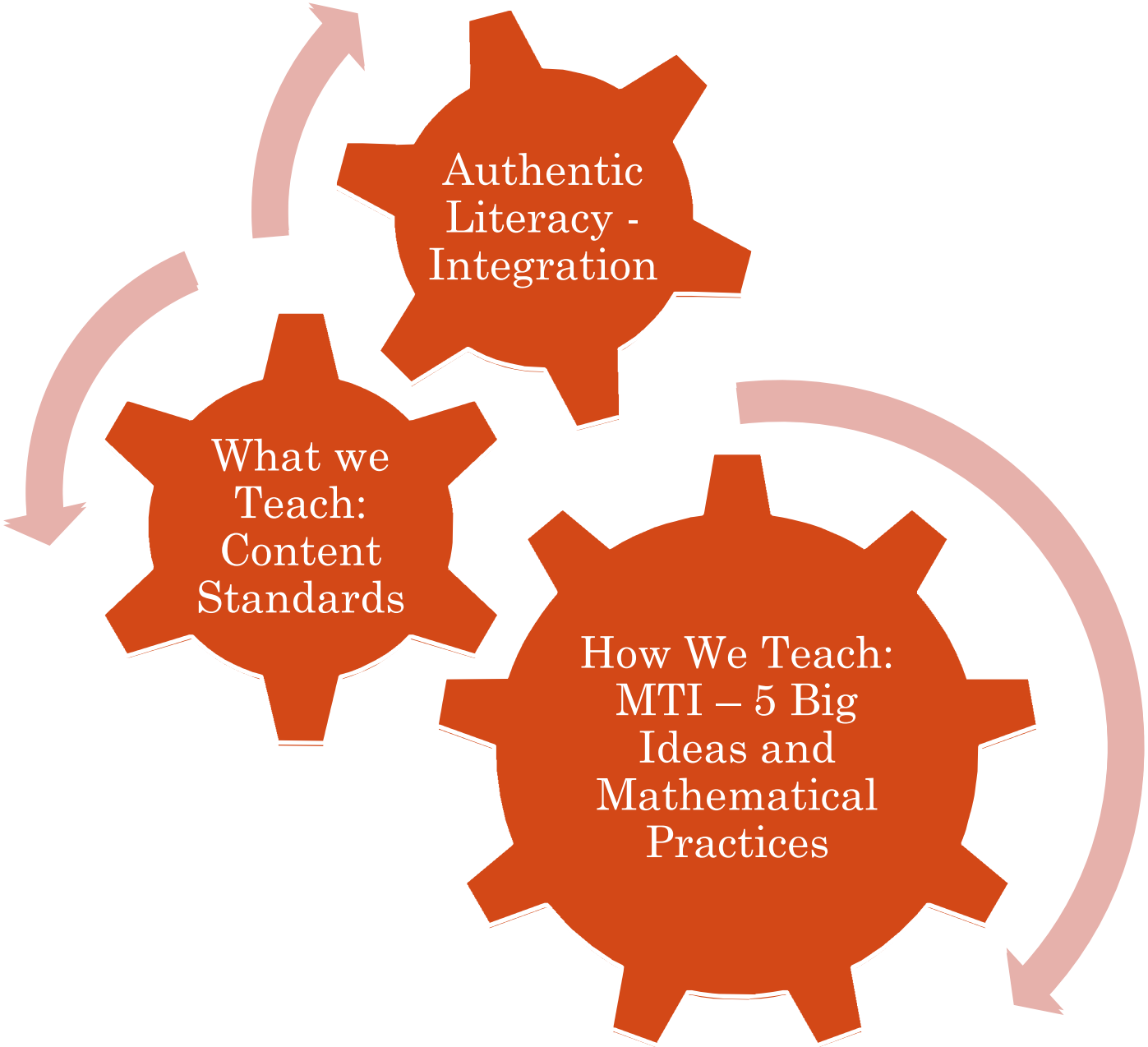
Number and Operations in Base Ten

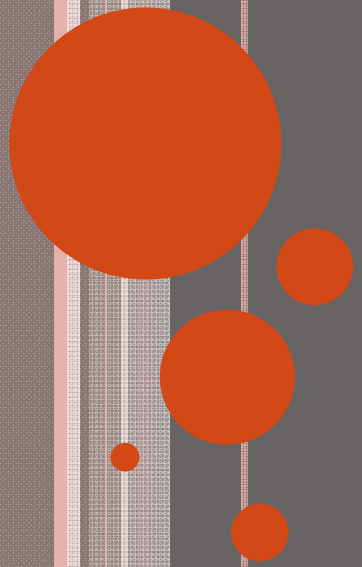
Measurement and Data

Number and Operations - Fractions

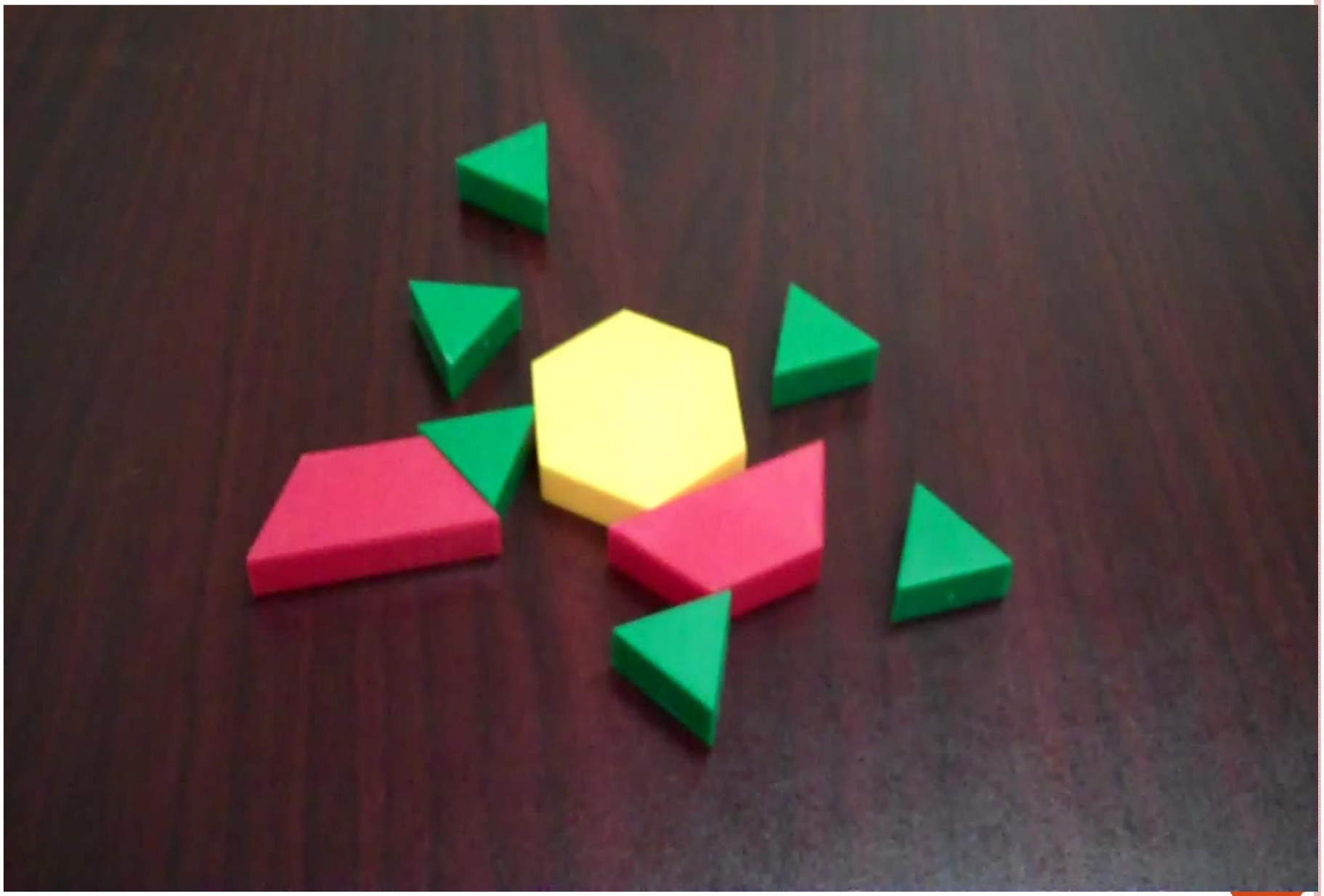
Focus

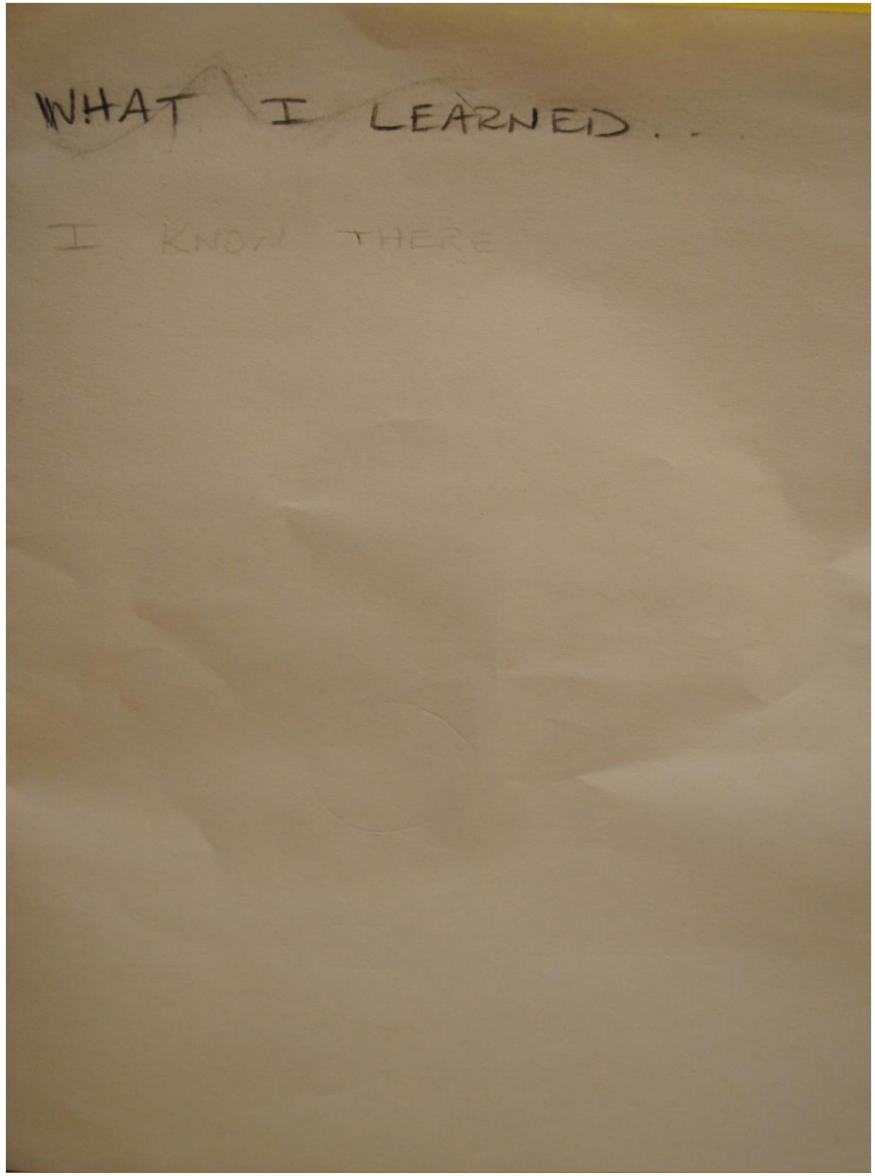
- What We Teach
- How We Teach
- Integrated Literacy


Authentic Literacy - Integration
What we Teach: Content Standards
How We Teach: MTI – 5 Big Ideas and Mathematical Practices



Putting it all Together




WHAT I LEARNED...
I KNOW THERE

What We Teach

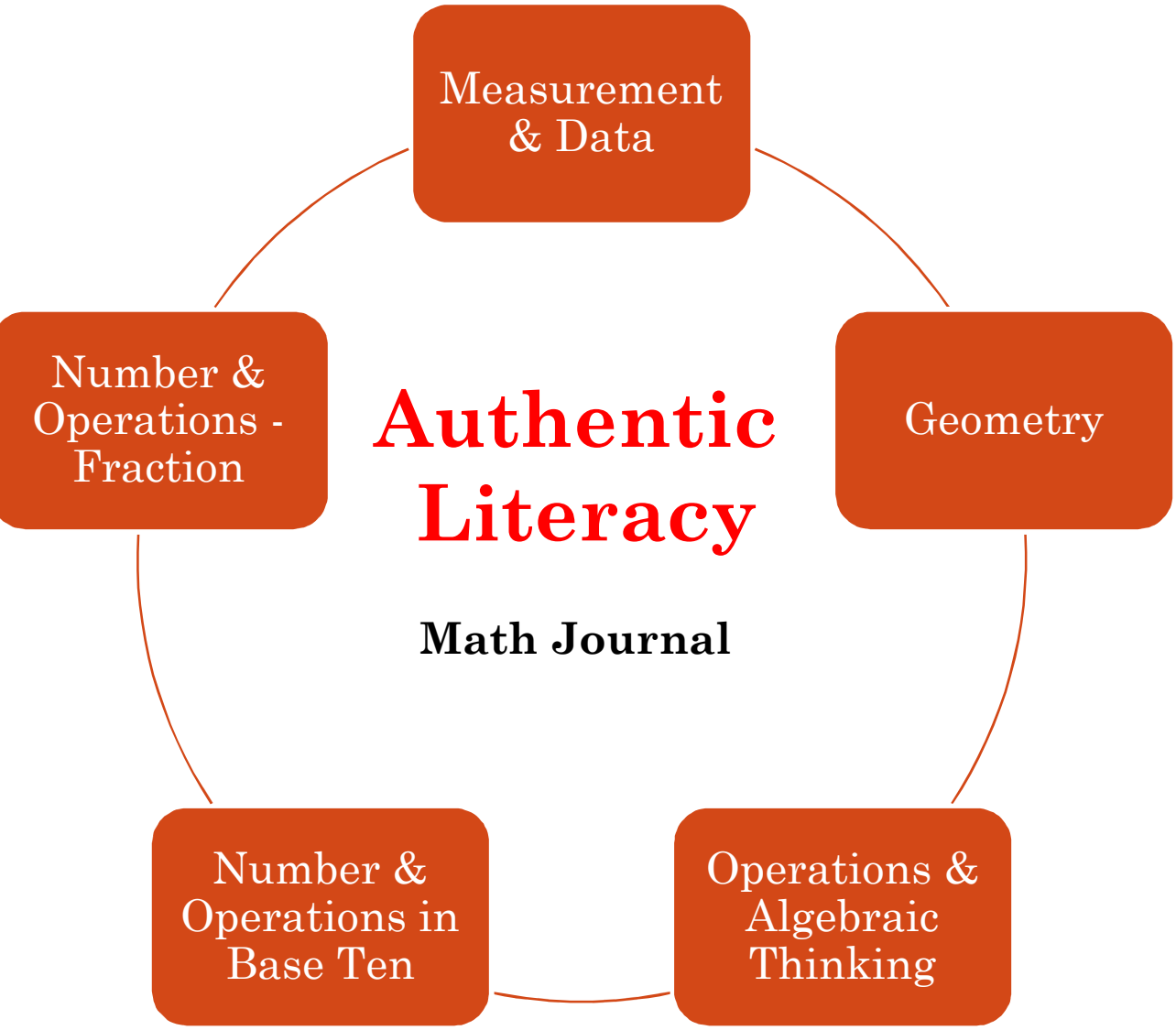
Content Standards

4th GRADE

- 4.MD 5a, 5b, &7 — Measurement & Data
- 4.G 1 — Geometry
- 4.OA 2 — Operations & Algebraic Thinking
- 4.NBT 5 & 6 — Number & Operations in Base Ten
- 4.NF 3d — Number & Operations - Fractions

How We Teach

MTI – 5 Big Ideas & Mathematical Practices



INTEGRATION

Authentic Literacy

"Geometry is grasping space…that space in which the child lives, breathes, and moves. The space that the child must learn to know, explore, conquer in order to live, breathe, and move better in it."

-Hans Freudenthal